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(54) Workload management system

(57) A workflow management system for managing the service of clients of an organisation comprising:
appointment pre-arrangement means for arranging appointments times for clients;
client identification provision means for providing clients with a unique client identifier;
client identification means for identifying those clients having prearranged appointment times and those clients not having prearranged appointment times, upon arrival;
and directional display means for directing clients to a plurality of service points in a predetermined order comprising substantially giving preference to said clients having prearranged appointment times.
Urgency of an activity can be indicated by a displayed colour.
Clients can be directed by name, using voice recording means.

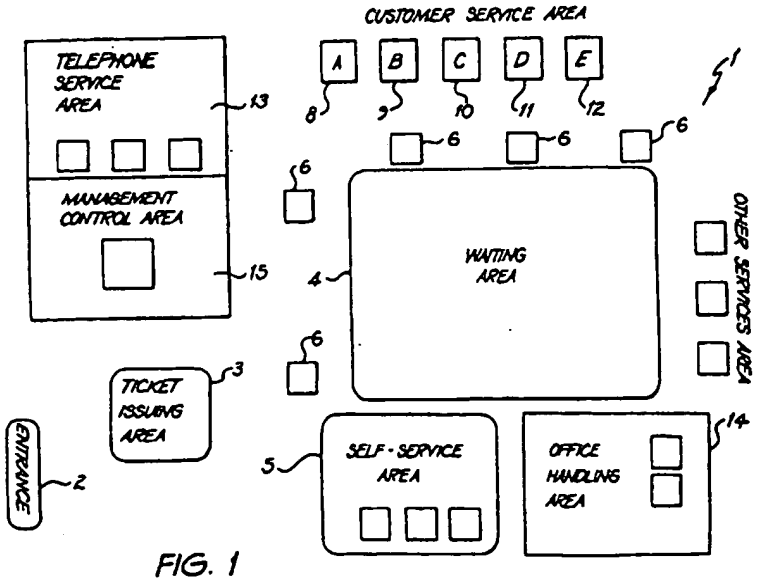

FIG. 1

GB 2 315 350 A

One drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

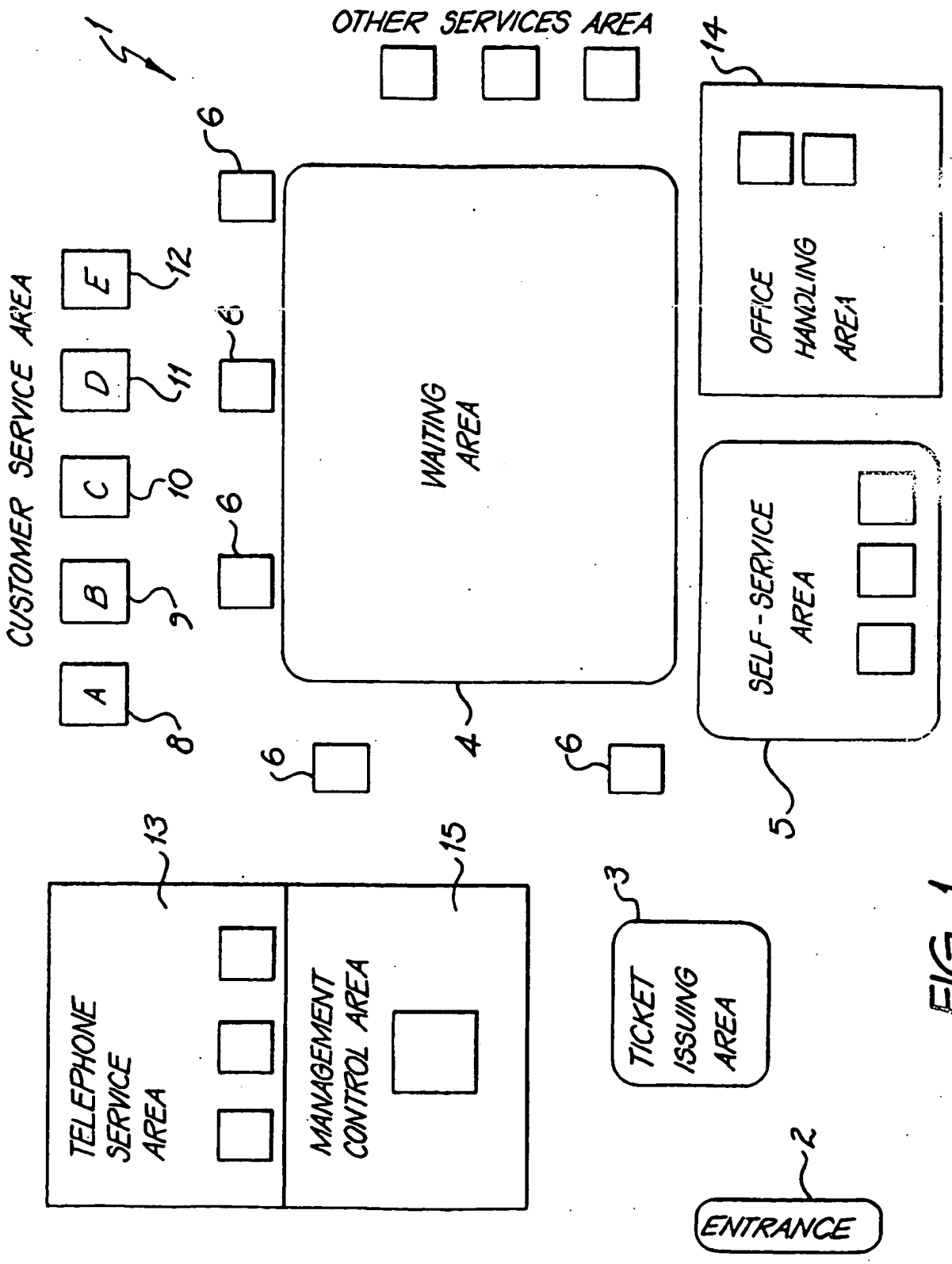
1
OTHER SERVICES AREA
CUSTOMER SERVICE AREA
A
B
C
D
E
8
9
10
11
12
6
WAITING AREA
4
OFFICE HANDLING AREA
14
SELF-SERVICE AREA
5
TELEPHONE SERVICE AREA
13
MANAGEMENT CONTROL AREA
15
TICKET ISSUING AREA
3
ENTRANCE
2

FIG. 1

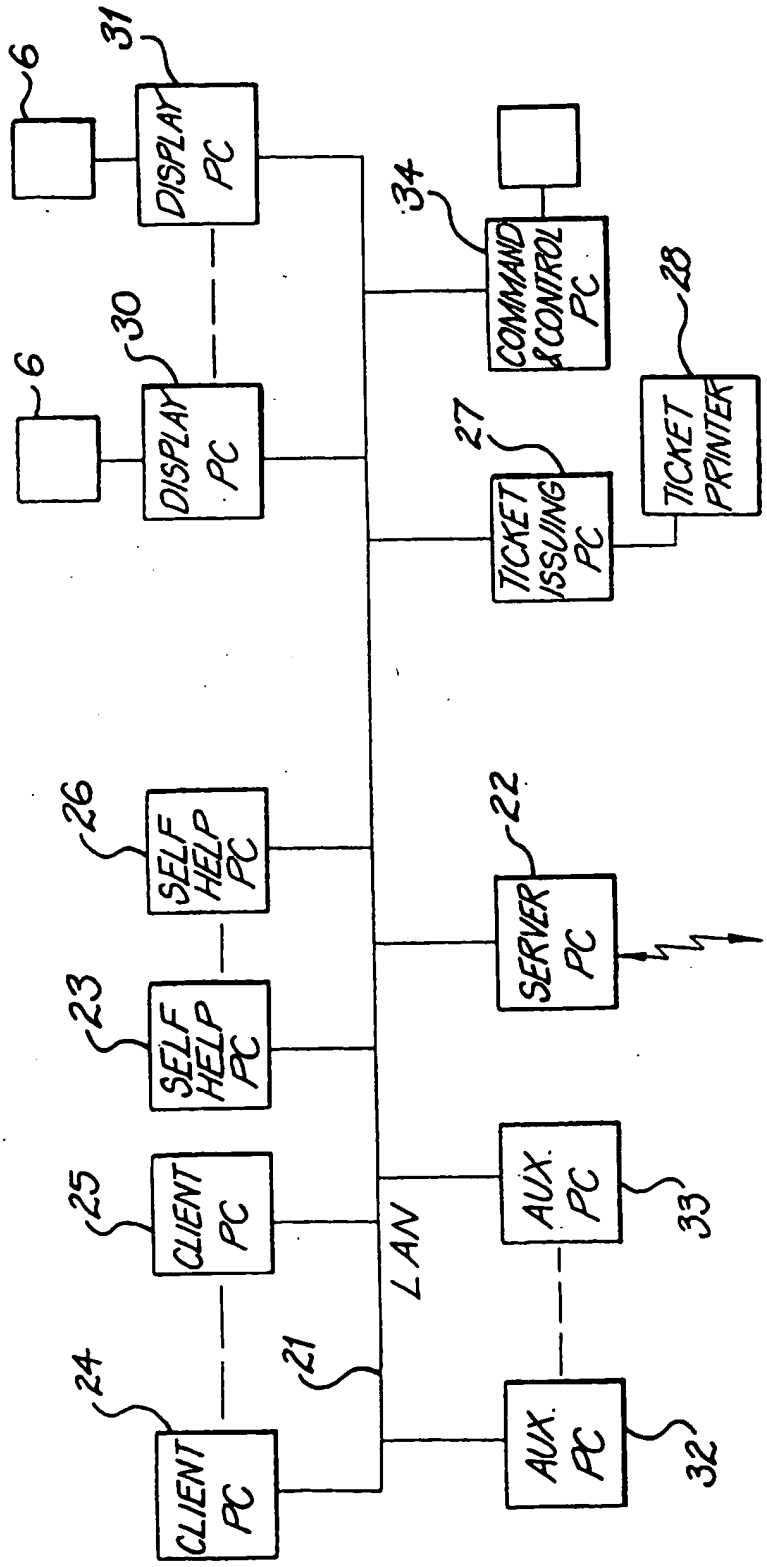
20
6
31
DISPLAY PC
6
30
DISPLAY PC
34
COMMAND & CONTROL PC
28
TICKET PRINTER
27
TICKET ISSUING PC
26
SELF HELP PC
22
SERVER PC
23
SELF HELP PC
25
CLIENT PC
LAN
AUX. PC
33
24
CLIENT PC
21
AUX. PC
32

FIG. 2

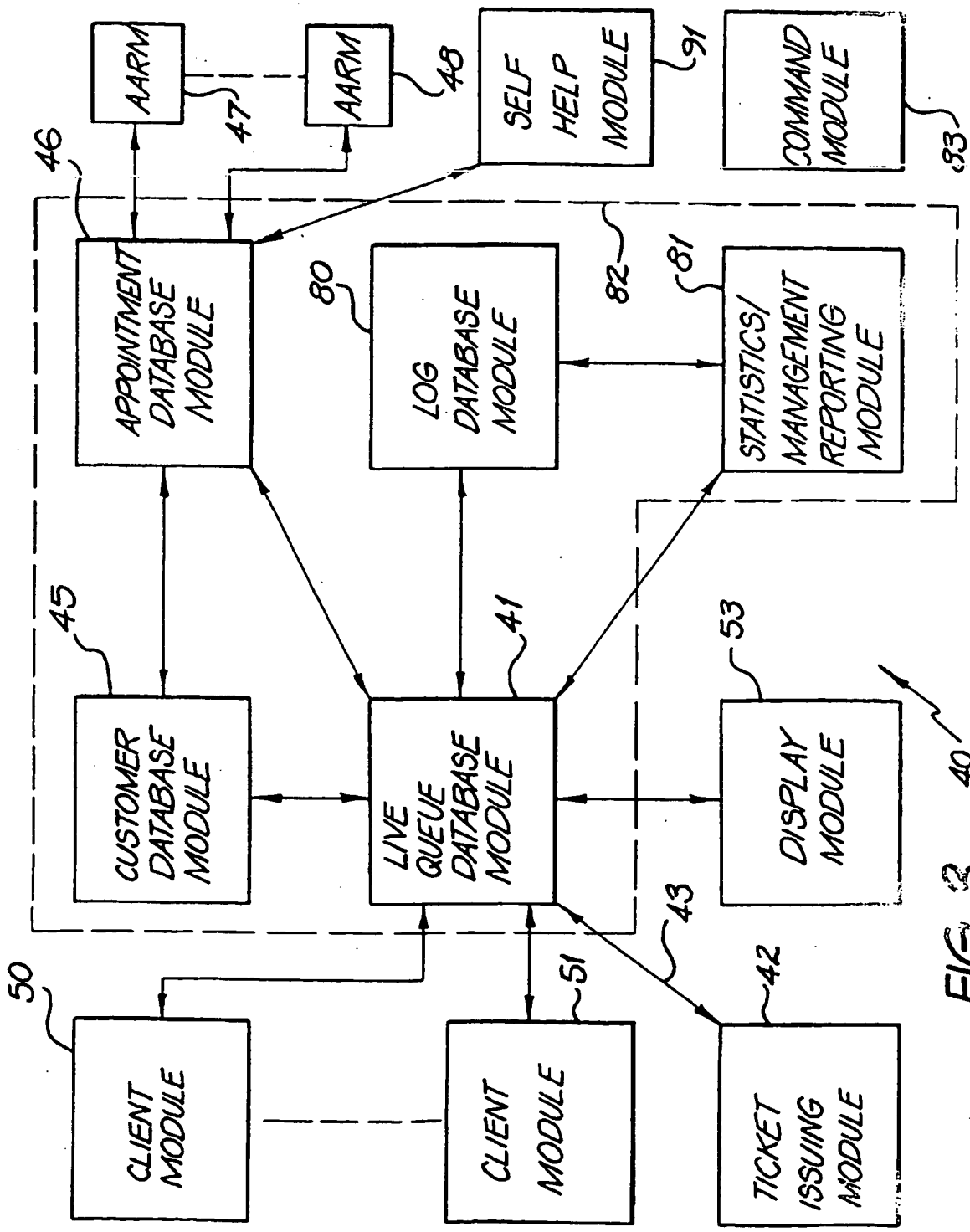
AARM
AARM
47
48
SELF HELP MODULE
91
COMMAND MODULE
83
46
APPOINTMENT DATABASE MODULE
80
LOG DATABASE MODULE
82
81
STATISTICS/ MANAGEMENT REPORTING MODULE
45
CUSTOMER DATABASE MODULE
LIVE QUEUE DATABASE MODULE
41
53
DISPLAY MODULE
40
43
50
51
42
CLIENT MODULE
CLIENT MODULE
TICKET ISSUING MODULE

FIG. 3

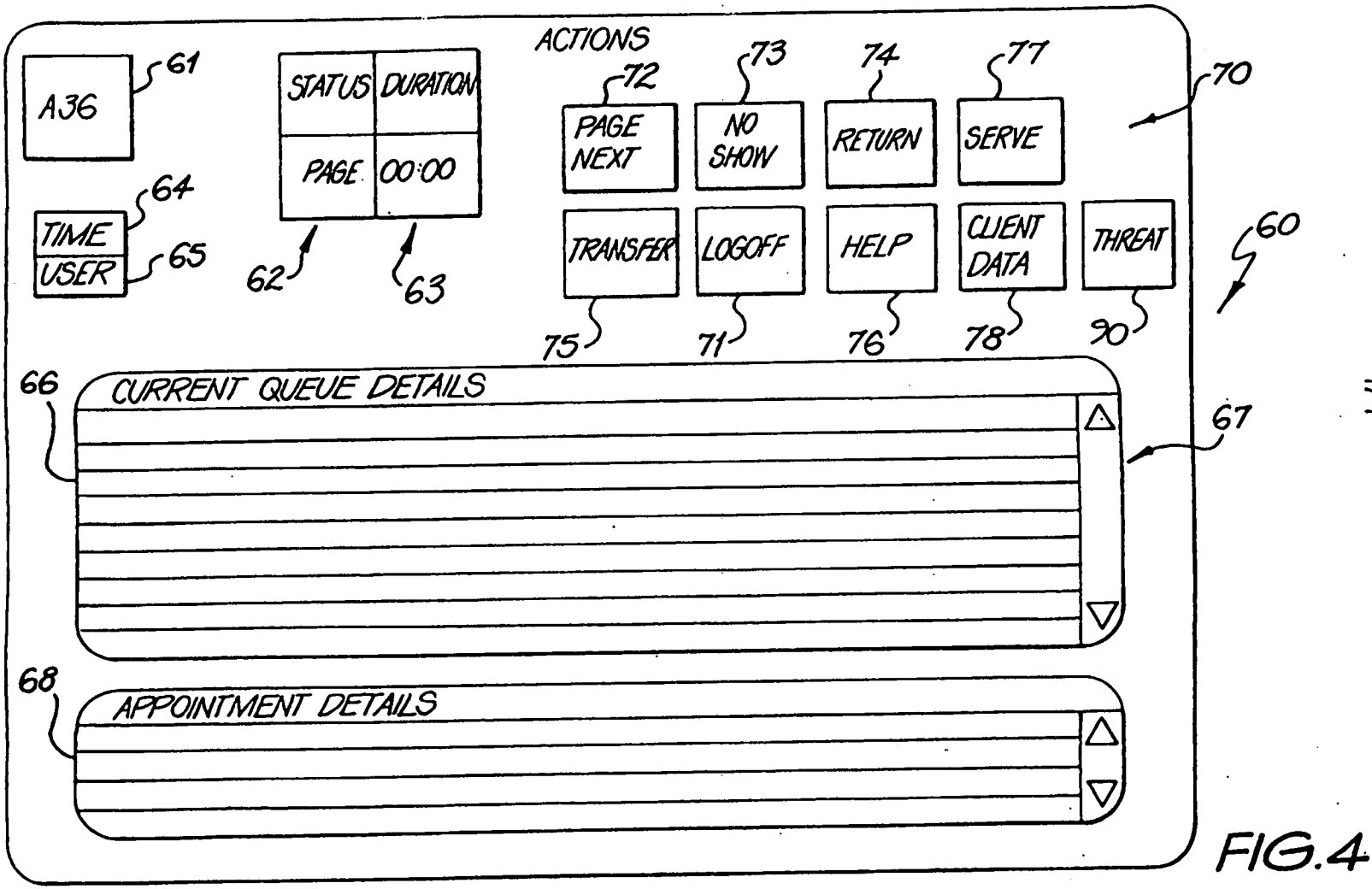
A36
61
STATUS
DURATION
PAGE
00:00
62
63
64
TIME
USER
65
ACTIONS
72
PAGE NEXT
73
NO SHOW
74
RETURN
77
SERVE
70
TRANSFER
LOGOFF
HELP
CLIENT DATA
THREAT
60
75
71
76
78
90
66
CURRENT QUEUE DETAILS
67
68
APPOINTMENT DETAILS

FIG.4

Workload Management System

Field of the Invention

The present invention relates to managing workload amongst a number of operators and has specific application to an environment where customers having a variety of needs interact with workers whose occupation is to service the customers and to meet their needs.

Background of the Invention

Various limited queue control system presently exist. For example, one known system involves customers "taking a number" from a list of supplied numbers. The customers are then treated by servers in numerical order. Such systems have limited efficiencies in that they are highly inflexible in operation, they are adaptable to only limited intelligence gathering techniques, they do not deal with exceptional cases such as persons having prior arranged appointments or customers needing to see multiple servers in order to meet their needs.

In another known system, the numerical system is "automated" to a degree whereby customers, upon entry into a serving area, are instructed to take a number in accordance with their requirements and are eventually directed to a server able to meet their needs by means of an audio visual display. However, such systems again have significant disadvantages. Firstly, known systems are hardwired in that the systems are set up to have a first arrangement and, should any changes need to be made in accordance with changing needs and requirements, a major rewiring of the service facility is required. Further, such systems involve no "intelligence" or synergisms in the interconnection of the customer arriving with the information which may be available on that customer to the organisation that is in the position of serving that customer. With prior systems, each customer is treated merely as a number and is not in any way identified and the queue workload management system does not in any way take into account the customer details when managing service of customers. Such systems

can lead to general dissatisfaction of an organisation amongst customers.

Further, such automated systems include only limited "intelligence gathering" abilities, and do not include any sophisticated ability to deal with exceptional cases and in particular where one customer must interact multiple times with different servers.

Summary of the Invention

It is therefore an object of the present invention to provide an alternative form of workload management systems where substantial synergisms and efficiencies can be realised.

In accordance with a first aspect of the present invention, there is provided a workflow management system for managing the service of clients of an organisation comprising:

appointment pre-arrangement means for arranging appointments times for clients to attend a service area of the organisation;

client identification provision means for providing clients with a unique client identifier;

client identification means for identifying those clients having prearranged appointment times and those clients not having prearranged appointment times upon arrival at the service area of the organisation;

directional display means for directing clients to a plurality of service points for serving clients after their arrival at the service area; and

system controller means connected to said appointment pre-arrangement means, said client identification means and said directional display means and adapted to utilise said directional display means to direct clients to said service points in a predetermined order, said order comprising substantially giving preference to said clients having prearranged appointment times in comparison with clients not having pre-arranged appointment times.

In accordance with a second aspect of the present

invention there is provided a method for managing workflow wherein said workflow comprises a number of outstanding activities, said method including displaying a colour indicator corresponding to the urgency to which an outstanding activity must be completed.

In accordance with a third aspect of the present invention there is provided a workflow management system for managing the provision of services to clients of an organisation, said system including:

a series of customer service areas for providing services to clients;

a waiting area for customers to wait while awaiting services;

an oral direction means for providing oral directions to customers to direct them to said customer services areas in accordance with requirements;

customer voice recording means for recording the oral pronunciation of the name of a customer, said oral pronunciation being utilised by said oral direction means in the direction of customers to said customer service areas.

Preferably, the service points include information display means controlled by the system controller means and adapted to display queue details of clients awaiting service at the service point. The display details include indicator details indicating the length of time each display client has been waiting for service at the service points. The indicator can preferably include a colour indicator whose actual colour at any point in time reflects the length of time each display client has been awaiting service.

The system is preferably implemented on a LAN based computer network utilising the latest object oriented techniques. In this respect, the system controller means preferably includes software portions including:

a queue module including current queue details of clients awaiting service by said organisation;

an appointment data base module adapted to be

interrogated by said appointment pre-arrangement means and to store said pre-arranged appointment times;

a client database module for storing relevant client details of clients of said organisation;

a plurality of service display modules adapted for utilisation at said service points for interrogation and updating of said queue module to reflect the current status of said current queue details.

The system also preferably includes an integral client self help means for clients to interact with to obtain automated assistance for various predetermined activities they desire to undertake. The client self help means can preferably include means for recording messages, such as name pronunciations, which can be utilised by the system, such as for the playback of the user's name by the directional display means.

The service display module preferably is further adapted to display and update the prearranged appointment times and the relevant client details.

Brief Description of the Drawings

Further, preferably the information display means includes an alert means for depressing upon a service provider requiring urgent assistance.

Notwithstanding any other forms which may fall within the scope of the present invention, preferred forms of the invention will now be described, by way of example only, with reference to the accompanying drawings in which:

Fig. 1 illustrates a typical office layout for use with the preferred embodiment;

Fig. 2 illustrates a LAN type network suitable for use with the preferred embodiment;

Fig. 3 illustrates the software design of the preferred embodiment; and

Fig. 4 illustrates a suitable form of user interface for a client module of the preferred embodiment.

Description of Preferred and Other Embodiments

Referring now to Fig. 1, there is illustrated a

customer service area which has been adapted for use in accordance with the principles of the present invention. The customer service area 1 is assumed to have an entrance 2 from which customers enter and exit. A ticket issuing area 3 is provided where customers are instructed to obtain a ticket in accordance with their requirements. As will become more apparent hereinafter, the ticket issuing area 3 may include one or more touch screen visual display units (VDU's) which instruct a customer to select the service required from a number of different categories. In addition to the category of service required, a separate category may be included for customers having prior arranged appointments at particular times. Such customers are requested to enter identification details by means of keyboard data entry or bar code entry or other forms of data input. In any event, ticket issuing areas 3 preferably also includes, for those customers having prior dealings with the relevant organisation operating customer service area 1 a form of identification means for the identification of that customer. The identification details can include for example, membership number, account numbers etc. Where such information is not available, no data entry is required. Ticket issuing area 3 then dispenses a unique identification ticket to a customer which can include alphabetical characters and/or numerical numbers.

The customer is then directed to waiting area 4 which may include seating and other facilities. Information is then displayed on monitor devices 6 directing ticket holders or customers to the various customer service area counters 8-12.

Alternatively, optional speakers can be provided to allow for oral paging in addition to visual paging.

Alternatively, experienced customers can go to a self-service area 5 which is provided with a number of computers for utilisation by customers to perform a number of functions such as booking future appointments etc. The computers within self-service area 5 can

include touch screen or mouse and key board type computers and associated printers. The facilities provided by the computers of self service area 5 can be quite flexible and fully extendible and can include information displays and instructions, interactive type interrogation of the user's needs, printing out forms, information and brochures as required, optical character recognition of forms inputted by customers, etc. Advantageously, preferably the computers within self service area 5 monitor their usage and collect statistics and generally assist in service delivery within customer service area 1. Preferably, the computer service area 5 also includes voice recording and analysis systems for recording various portions of a user's speech. For example, in one scenario, the pronunciation of a person's full name can be recorded for later use in oral paging. The use of oral paging is particularly significant in producing mispronunciation errors associated with complex surnames of many dialects.

There is preferably also provided a telephone service area 13 having a number of telephonists taking customer calls requesting appointment times to attend the customer service area 1 so as to attend to their needs. The preferred embodiment also preferably includes an office handling area 14 which is designated to handle all office correspondence and interaction with customers and, in particular, is responsible for letter and facsimile correspondence with customers so as to arrange appointment times for customers to attend the customer service area 1. It will be readily apparent to those skilled in the art as described hereinafter that office handling area 14 and telephone service area 13 may be at a physically removed location from customer service area 1, being merely within direct electronic communication with the customer service area 1.

Preferably, there is also provided a management/control area 15 which is removed from customer service area 1 but from which it is possible to monitor

the operation of the customer service area 1 as will become more readily apparent hereinafter.

The described embodiment of Fig. 1 relies fundamentally upon an integrated network collection of computers. This integrated network could take a number of different well known forms. These forms can include a collection of terminals connected to a larger mainframe type computer or in the form of a local area network (LAN). Of course, different types of LAN networks are possible utilising well known differing technologies from individual manufacturers. For example the LAN network could be constructed around Microsoft Windows NT, Unix, Novell Netwarre, Apple Macintosh O/S, IBM's OS/2 etc. It will be readily apparent to those skilled in the art that the present invention is not limited to any particular form of network.

Referring now to Fig. 2, for purpose of description, it is assumed that a common LAN type network is to be utilised and, in particular, a common Microsoft Windows NT (Trade Mark) LAN network is to be utilised. Such a LAN network can comprise a number of personal computers (PC) connected together on an Ethernet type backbone 21. The LAN network 20 is further based, in the usual form, around a server PC 22 which is high end type PC running a sophisticated operating system such as Microsoft Windows NT (Trade Mark) or Unix (Trade Mark). The server PC, in the usual manner, is responsible for storage of all data and for carrying out further software processing, as will become more apparent hereinafter.

Interconnected to the server PC 22 are firstly a series of client PCs 24 to 25. The client PCs can run Microsoft Windows 95 (Trade Mark) or Microsoft Windows 3.1 or higher, the number of client PC's being determined in accordance with requirements. Normally, one client PC will be provided for each of the customer service counters 8-12 of Fig. 1. Preferably, a set of self help PC's e.g. 23, 26 are provided for utilisation in self help area 5 (Fig. 1) which can run various self help

programs as required.

A personal computer 27 and ticket printer 28 are provided for the control and management of ticket issuing area 3 with the ticket issuing PC 27 including the various input means as aforementioned, such as touch screen, bar code reader, etc. The monitors 6 of Fig. 1 are controlled by display PC's 30, 31. The number of display PC's being dependent on requirements with each display PC preferably controlling multiple monitors 6 by utilisation of videos splitters or the like. Further, a series of auxiliary PC's 32 to 33 are provided in accordance with requirements and are utilised, as will become more apparent hereinafter, by telephone service area 13 and office handling area 14 of Fig. 1 for the purpose of scheduling appointments.

Command and control PC 34 is provided for the overall control and monitoring of LAN type network 20 and is conveniently placed in management and control area 15 of Fig. 1.

It will be evident that various software programs are to be utilised to tie all the LAN network computers 20 together. As noted earlier, it is assumed that server PC 22 runs a high end operating system able to utilise multi tasking to control the LAN type network 20 in the normal manner and is itself under the command and control of command and control computer 34.

Referring now to Fig. 3, there will now be illustrated one form of description of software running across LAN network 20 of Fig. 2. It will be readily apparent to those skilled in the art of software design that the software system 40 can take many different forms with the form taken depending on actual requirements in any particular circumstance.

It is assumed that object oriented programming techniques are fully leveraged and the latest software compilers and application development tools are utilised to construct the software system 40. These for example, may include Microsoft, Borland or Sematech Visual C++

application development programs, or Visual Basic, including the usual graphical user interface (GUI) libraries and tools where required etc. The software system 40 can be constructed in terms of objects, instances and message passing between objects.

The design of a software system for controlling the LAN network 20, is based around a central Live Queue Database Module (LQDM) 41. This module is responsible for storing the current state of those individuals waiting within waiting area 4. When each new ticket is issued by ticket issuing module 42, the details including time of ticket arrival, type of service required and any customer details are forwarded 43 from ticket issuing module 42 to LQDM 41. The LQDM updates its database of waiting clients with the details received from the ticket issuing module 42.

The LQDM 41 is responsible for placing a particular client in a particular position within the queue in accordance with predetermined policies. These policies can be extremely flexible and adjustable. For example, customers having prearranged appointment times can be slotted in intermediate or advance positions within the queue upon arrival so as to limit their waiting time and to generally encourage the making of appointments by customers. Further, customers without appointments may be placed at the end of a queue. Alternatively, the queue can be managed by categories. The customer servers 8-12 (Fig. 1) can then be specialised by category so as to only serve customers of a predetermined category type, with the LQDM module 41 ensuring that the correct customer service specialist serves each category of customer. Further, servers in customer service area 8-12 (Fig. 1) can be provided with the ability to alter a persons priority in any queue.

Ticket issuing module 42 runs on ticket issuing PC 27 and has an associated graphical user interface for the input of ticket selection information by users upon entering ticket issuing area 3. The ticket issuing

module 42 is able to access a customer database module 45 which contains all the known details of each known customer of the service provider. Hence, the new customer arriving can be given a predetermined number to enter at ticket issuing module 42 with the module 42 determining the customer details from customer database module 45 and forwarding them 43 with the aforementioned information to the LQDM 41.

An appointment database module 46 is further provided for the registering of specific time appointments for customers to attend the customer service area. The appointment database module 46 is responsible for storing all registered appointment times and is adapted to be interrogated by one or more Auxiliary Appointment Request Modules (AARM) 47, 48. The AARM 47 can consist primarily of a graphical user interface to the appointment database module 46 and is designed to run on auxiliary PC's 32 to 33 (Fig. 2) for the creation of appointment times for customers utilising the telephone service area 13 and the office handling area 14. Upon registering of each appointment in the appointment database module 46, the details are also conveyed to the customer via telephone or letter as available. Those customers having appointment times are able to designate this selection when approaching ticket issuing area 3, thereby notifying ticket issuing module 42 of the arrival of an individual for a particular appointment.

Each client PC 24, 25 (Fig. 2) runs a client module e.g. 50 which includes a graphical user interface (GUI) 60 for interaction between customers and customer servers.

Referring now to Fig. 4, there is illustrated one form of graphical interface suitable for use with client module 50. The GUI 60 utilises the normal "windowing" interface of point and click mouse buttons etc and includes a number of information displays including a current ticket number display 61 for displaying a current ticket number to be dealt with by the particular client

module 50. There is also included current status indicator 62 and duration of status indicator 63 for the current ticket 61. A current time 64 and client module user indicator 65 is also provided for convenience.

The current queue status including all paged and waiting customers is also included 66 with scroll bar 67. The current queue details are updated by Queue Module 50 from the LQDM 41 (Fig. 3).

Further, a list of appointment details for upcoming expected appointments is also provided 68, giving information on expected appointment arrivals.

A user of the client module 50 interacts with the user interface 60 by means of a number of action buttons 70. These action buttons can include a "log off" button 71 for quitting the client module 50, a "page next" button 72 for paging a next customer, a "no show" button 73 to indicate that the current ticket holder 61 has not shown after a predetermined time, a button 74 to return a current user to the queue at a predetermined position, a button 75 to transfer a user from a first client module operator to a second client module operator for specialist help, a request help button 76 for requesting help from a supervisor and a client data button for bringing up access to all a client's details via Customer Database module 45 (Fig. 3). Further, a threat button 90 can be provided where deemed desirable. This button can be depressed when a customer becomes agitated and a server fears a dangerous circumstance may shortly arise. Pressing this button (or an alternative key board sequence) may have the effect of notifying other servers (via other client modules) and the management control area 15 (via command module 83) of the likely troublesome customer. Of course, other buttons can be provided in accordance with differing requirements.

The utilisation of a sophisticated graphical user interface for the client module GUI 60 can provide for a number of enhancements. For example, the colour of entries within the current queue details portion 66 can

be updated in accordance with the period of waiting of each member within the queue. For example, where the members of the queue have only been waiting a short interval, they can be displayed in a green colour. However, where the members of the queue have been waiting for a long period of time, they can be displayed in a red colour. Hence, the operator of client module 50 can instantly determine the approximate length of wait of the customer they are going to serve and be more aware the customer's likely state of mind. Further, many refinements are possible, for example, the queue 66 could be made up of a graphical objects having customer names which, when clicked on, "bring up" customer history details from the customer database module. It will be readily evident to skilled computer programmers that other informative information can be provided by graphical user interface 60.

Referring again to Fig. 3, the actions performed on each client module e.g. 50 via its user interface are utilised to correspondingly update information in the LQDM 41 which in turn updates the various queue displays of the client modules 51. Similarly, changes in the appointment database module 46 which may occur are also instantly reflected in the appointment details display of 68 (Fig. 4) of each client module 50.

Upon receiving requests to page a customer from a client module 50, the LQDM determines the next customer on the current queue to be paged and forwards the details to display module 53 which resides on display PC 30 (Fig. 2) and display PC 31 and is responsible for displaying paging information on the monitors 6 directing customers from the waiting area 4 (Fig. 4) to the correct customer service counter 8-12. The display module 53 cyclically displays relevant directions until such time as it is notified by the LQDM 41 that the customer has arrived at the customer service counter or that the paging has been cancelled and to discontinue display of a particular item. These occurrences are in turn communicated from

client modules 50 by means of action buttons and of the graphical user interface 60 of Fig. 4.

For each self help PC e.g. 23 (Fig. 2) a self help module 91 is provided for running of the various aforementioned self help software. This module 91 can include interrogation means into the appointment database module 46 for the setting and reviewing of possible appointment times for customers wishing to utilise the self service area 5 (Fig. 1). The self help module can be customised to meet a particular service provider's needs and can be readily extended to be of increasing complexity over time. The self help module can include document browsers for viewing HTML files of relevant documents for printing out in addition to Java Applets for the interactive entry of information.

A log database module 80 (Fig. 3) is provided for the logging of all events occurring within the LQDM module 41. All events are logged for later analysis. The LQDM 41 and log database module 80 can preferably be interrogated by means of statistics/management module 82. This module is provided to provide real time and historical reports as required by management. Reporting information can include:

- current workload;
- customer traffic and movements;
- customer mix and entry type;
- individual waiting times;
- progressive average waiting times for each customer type;
- measurements against performance standards;
- queue depths for each category of entry per hour;
- throughput for each entry type;
- totals per hour;
- individual server performance;
- break down in numbers and percentages in waiting time distribution both inside and outside any Performance Pledge Criteria; and

extremes of waiting times (the averages may appear to be satisfactory, however, extreme cases usually represent unhappy customers and these are the customers who may make complaints).

Although it would be evident to those skilled in the art that the arrangement 40 is extremely flexible and can be distributed across network 20 (Fig. 2) in a number of ways, preferably those software modules delineated within the broken line 82 operate on server PC 22 (Fig. 2). Further a command module 83 is also provided for the overall control of software system 40 and preferably runs on command and control computer 34 (Fig. 2). The command module 83 is utilised to access and monitor the system 40 and can include such facilities as setting up various password requirements, the addition and deletion of extra client modules 50-51, the attaching and detaching of auxiliary appointment request modules eg 47-48, the regular production of statistical reports by statistics/management reporting module 81 etc.

The preferred arrangement has particular applications in a number of environments. For example, service provides such as hospitals and medical centres could readily utilise such a system. Additionally, government departments, large companies can also readily use the preferred embodiment.

It would be appreciated by a person skilled in the art that numerous variations and/or modifications may be made to the specific embodiment as described without departing from the spirit or scope of the invention as broadly described. The present embodiment is, therefore, to be considered in all respects to be illustrative and not restrictive.

We Claim:

1. A workflow management system for managing the service of clients of an organisation comprising:

appointment pre-arrangement means for arranging appointments times for clients to attend a service area of the organisation;

client identification provision means for providing clients with a unique client identifier;

client identification means for identifying those clients having prearranged appointment times and those clients not having prearranged appointment times upon arrival at the service area of the organisation;

directional display means for directing clients to a plurality of service points for serving clients after their arrival at the service area; and

system controller means connected to said appointment pre-arrangement means, said client identification means and said directional display means and adapted to utilise said directional display means to direct clients to said service points in a predetermined order, said order comprising substantially giving preference to said clients having prearranged appointment times in comparison with clients not having pre-arranged appointment times.

2. A system as claimed in claim 1 wherein said service points include information display means controlled by said system controller means and adapted to display queue details of clients awaiting service at said service points.

3. A system as claimed in claim 2 wherein said display details include indicator details indicating the length of time each displayed client has been awaiting service at said service points.

4. A system as claimed in claim 3 wherein said indicator includes a colour indicator whose actual colour at any point of time reflects the length of time each displayed client has been awaiting service.

5. A system as claimed in claim 2 wherein said

system controller means includes software portions including:

a queue module including current queue details of clients awaiting service by said organisation;

an appointment data base module adapted to be interrogated by said appointment pre-arrangement means and to store said pre-arranged appointment times;

a client database module for storing relevant client details of clients of said organisation;

a plurality of service display modules adapted for utilisation at said service points for interrogation and updating of said queue module to reflect the current status of said current queue details.

6. A system as claimed in claim 5 wherein said service display modules are further adapted to display and update said pre-arranged appointment times and said relevant client details.

7. A system as claimed in claim 1 further comprising client self help means for clients may obtain automated assistance for predetermined activities they desire to undertake.

8. A system as claimed in claim 7 wherein said predetermined activities include the booking of appointment times to attend a service area of said organisation.

9. A system as claimed in claim 7 wherein said client self help means includes means for recording oral messages input by said clients.

10. A system as claimed in claim 9 wherein said oral messages include the pronunciation of names or the like and said directional display means includes audio output means for outputting said pronunciations when directing clients to said service points.

11. A method for managing workflow wherein said workflow comprises a number of outstanding activities, said method including displaying a colour indicator corresponding to the urgency to which an outstanding activity must be completed.

12. A workflow management system for managing the provision of services to clients of an organisation, said system including:

a series of customer service areas for providing services to clients;

a waiting area for customers to wait while awaiting services;

an oral direction means for providing oral directions to customers to direct them to said customer services areas in accordance with requirements;

customer voice recording means for recording the oral pronunciation of the name of a customer, said oral pronunciation being utilised by said oral direction means in the direction of customers to said customer service areas.

13. A workflow management system substantially as herein before described with reference to the accompanying drawings.